



Research article

Prevalence of mental health symptoms and its effect on insomnia among healthcare workers who attended hospitals during COVID-19 pandemic: A survey in Dhaka city



Mohammad Ali^{a,b,f,*}, Zakir Uddin^c, Nawara Faiza Ahsan^d, Muhammad Zahirul Haque^e,
Monisha Bairagee^e, Sabbir Ahmed Khan^g, Ahmed Hossain^{e,f}

^a Department of Physiotherapy and Rehabilitation, Uttara Adhunik Medical College and Hospital, Dhaka, 1230, Bangladesh

^b Hasna Hena Pain, Physiotherapy and Public Health Research Center (HPRC), Dhaka, 1230, Bangladesh

^c Bangladesh University of Health Sciences, Bangladesh

^d North South University, Basundhara, Dhaka, 1229, Bangladesh

^e Department of Public Health, North South University, Basundhara, Dhaka, 1229, Bangladesh

^f NSU Global Health Institute, Basundhara, Dhaka, 1229, Bangladesh

^g Uttara Adhunik Medical College, Dhaka, 1230, Bangladesh

ARTICLE INFO

Keywords:

Anxiety
Depression and insomnia
COVID-19
Dhaka city
Healthcare workers

ABSTRACT

Background: During the COVID-19 pandemic, the high workload, risk of infection, and safety issues for family members may pose a threat to the mental health of healthcare workers (HCWs) working in hospital settings. The study aimed to find out the prevalence of anxiety, depression, and insomnia symptoms were among HCWs, as well as the factors related to these mental health issues.

Methods: We conducted an online survey of HCWs employed in Dhaka city from June 6 to July 6, 2020. Symptoms of anxiety, depression, and insomnia were measured using the Generalized Anxiety Disorder, the depression module of the Patient Health Questionnaire, and the Insomnia Severity Index, respectively. The related factors of anxiety, depression, and insomnia symptoms were identified using three regression models.

Results: This research included responses from 294 HCWs (mean \pm standard deviation age: 28.86 ± 5.5 years; 43.5% were female). Anxiety, depression, and insomnia symptoms were found in 20.7%, 26.5%, and 44.2% of HCWs, respectively. The variable financial difficulties was commonly found as an associated factor for anxiety, depression, and insomnia symptoms. Female HCWs were more prone to mental health symptoms and insomnia compared to male HCWs (Adjusted odds ratio- AOR = 2.20, 95% CI = 1.27–3.79). The depression symptoms among HCWs were found to be a factor for insomnia (AOR = 6.321, 95% CI = 3.158–12.650).

Conclusion: In the current pandemic, the high prevalence of mental health symptoms among HCWs indicates that this occupational group being associated with increased mental distress. Increasing financial support for HCWs and providing support to female workers in care facilities could help to alleviate the burden of mental illness. Supportive, training, and educational strategies, particularly through knowledge and communication platforms, could be recommended to the care facilities, which can reduce the burden of mental health symptoms among HCWs.

1. Introduction

Coronavirus disease (COVID-19) has a large negative psychological effect and mental health issues worldwide due to its high morbidity and mortality rates (Brooks et al., 2020; Sasaki et al., 2020). The unexpected rapid spread of COVID-19 endowed HCWs with increased work

burden, lack of personal protective equipment, high risk of exposure and contracting the diseases, as well as increased mortality amongst HCWs (Barranco and Ventura, 2020; Gan et al., 2020; Herron et al., 2020). HCWs were forced to continue their duties amid the COVID-19 pandemic to provide healthcare services for both COVID-19 and non-COVID-19 patients potentially leading to causing enormous psychological distress

* Corresponding author.

E-mail address: m180002@student.bup.edu.bd (M. Ali).

<https://doi.org/10.1016/j.heliyon.2021.e06985>

Received 26 February 2021; Received in revised form 31 March 2021; Accepted 29 April 2021

2405-8440/© 2021 The Author(s). Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

(Chew et al., 2020; Di Tella et al., 2020). There have already been reports of HCWs committing suicide due to COVID-19-related stress (Rahman and Plummer, 2020).

A systematic review and meta-analysis suggested that the prevalence of anxiety, depression, and insomnia symptoms among HCWs during this pandemic were 23.2%, 22.8%, and 38.9% respectively (Pappa et al., 2020). Bangladesh is dealing with a major outbreak of COVID-19, which has overburdened the country's healthcare facilities. The capital Dhaka has a higher death rate among the general population and HCWs than other cities in Bangladesh. The high workload, continuous exposure, risk of infection, ethical decisions regarding rationing resources amongst patients, and safety concerns for family members threaten the mental health of HCWs currently working both in COVID-19 and non-COVID settings. The study aimed to determine the prevalence of mental health symptoms and insomnia among HCWs working in hospital settings in the Dhaka city area, as well as to identify associated factors of these symptoms.

2. Methods

2.1. Study design and participants

From June 6 to July 6, 2020, an online cross-sectional study was conducted among healthcare workers in Dhaka, Bangladesh following the CHERRIES checklist for online surveys (Eysenbach, 2004). Given that social distancing was practised during the COVID 19 pandemic, the questionnaire was generated using Google forms and sent to participants via online platforms such as email, WhatsApp, and Facebook. This technique has been found suitable in previous similar studies in Asia and other parts of the world during the COVID-19 pandemic (Şahin et al., 2020a; Xiaoming et al., 2020). In the first section of the questionnaire, there was a text with details about the demographic information. All the participants were required to give informed consent for participation and collection and analysis of their data by ticking the "Yes, I agree and hereby give my informed consent" box on the online form before partaking in the online questionnaire. While approximately 500 HCWs were invited conveniently, only 409 subjects filled out and returned the form giving an 80% response rate. To prevent more than one response from a participant, we have used the "Requires sign-in" option when adjusted the settings of Google Form. However, only HCWs working in a hospital in the Dhaka metropolitan area were included, and HCWs who were not working in any hospital settings were excluded from the study. Finally, responses from 294 HCWs were included for further analysis. Data were entered for analysis in a password-encrypted personal computer with a new unidentifiable code number after removing participants' names and registration digits to ensure confidentiality.

2.2. Ethical approval

Ethical approval was taken from the Ethical Review Committee (ERC) of Uttara Adhunik Medical College and Hospital and the Institutional Review Board (IRB) of North South University (NSU-IRB 4578). Participants or the public WERE NOT involved in the design, or conduct, or reporting, or dissemination plans of our research.

2.3. Sociodemographic, clinical, and occupational factors

Detailed data on sociodemographic, and clinical factors such as age, gender, living status, family size, and family member aged above 50 years, resident type, history of chronic disease, and maintaining isolation were collected. Data on occupation, technical job title, service category, and current working position were also recorded. Participants were also asked to answer yes/no questions to provide information on whether they were facing financial difficulties due to the impact of COVID-19.

2.4. Anxiety disorder symptoms

The Generalized Anxiety Disorder 2-item (GAD-2) was used to identify participants experiencing symptoms of general anxiety disorder. GAD-2 in the screening of generalized anxiety is a valid and frequently used scale, and a cutoff point ≥ 3 is recommended (Jordan et al., 2017; Löwe et al., 2010).

2.5. Depression symptoms

The Patient Health Questionnaire 9-item depression module (PHQ-9) was used to measure depressive symptoms. A scale ranging from 0 to 3 was used to score each of the nine items. The total score ranges from 0 to 27. The total score suggests different levels of depressive symptoms: minimal/no symptoms (0–4), mild (5–9), moderate (10–14), severe (15–21), and very severe (22–27). However, in this study, cut-off point ≥ 10 was used to classify participants as having depressive symptoms (Islam et al., 2020; Kroenke and Spitzer, 2002).

2.6. Insomnia symptoms

Finally, to measure the severity of insomnia the Insomnia Severity Index (ISI) was used. Each item is wreathed on a 0–4 scale, and the total score ranges from 0 to 28. A cumulative score of ≥ 8 is considered as having symptoms of insomnia (Morin et al., 2011; Zhang et al., 2020). A higher score suggests more intense Insomnia symptoms.

2.7. Data analysis

Descriptive analysis was done to determine the statistics of socio-demographic, economic, clinical, and occupation-related factors of the participants. Continuous variables were presented as mean and standard deviation while the categorical variables were displayed in number and percentage.

To find out factors associated with anxiety, depression, and insomnia symptoms, a univariate analysis has been performed. All significant levels were set at 0.05 alphas in this study.

Three multiple regression models were run to assess the predictability of the sociodemographic, economic, clinical, and occupational factors that were statistically significant in the univariate analysis. GAD-2, PHQ-9, and ISI scores were used as dependent variables for the first, second, and third regression model, respectively. Another multiple regression model was employed to find an association between mental health symptoms and insomnia. The Statistical Package for the Social Science (SPSS) software version 20.0, SPSS Inc., Chicago, IL, USA was used for the present study.

3. Results

3.1. Characteristic of the participants

The study included responses from 294 HCWs (mean \pm standard deviation age: 28.86 ± 5.5 years and 43.5% of were female). Among all the participants, 37.4 % were medical doctors, 9.5% dentists, 27.9% rehabilitation workers (physiotherapist, occupational therapist, speech therapist, and physiotherapy assistant), 9.5% nurses, and 15.7% medical technologists. Among the HCW, 17% had a chronic disease, 55.8% reported financial problems. Table 1 displays the full result. However, the Cronbach's alpha value for the items of anxiety scores, depression scores and insomnia scores in this study were 0.70, 0.80, and 0.90, respectively, which indicates an excellent internal consistency.

3.2. Factors associated with anxiety, depression, and insomnia symptoms

Anxiety, depression, and insomnia symptoms were found to be prevalent in 20.7%, 26.5%, and 44.2% of the participants, respectively.

Table 1. Descriptive data of socio-demographic, clinical, financial, and occupation-related factors.

| Factors | Mean (SD) | n (%) | Range |
|----------------------------------------|-------------|------------|-------|
| Age | 28.86 (5.5) | | 19–50 |
| <i>Gender</i> | | | |
| Male | | 164 (55.8) | |
| Female | | 128 (43.5) | |
| Others | | 2 (0.7) | |
| <i>Marital status</i> | | | |
| Never married | | 152 (51.7) | |
| Married | | 140 (47.6) | |
| Others | | 2 (0.7) | |
| Number of family member living with | 4.31 (1.9) | | 0–13 |
| <i>Family member age over 50 years</i> | | | |
| Yes | | 183 (62.2) | |
| No | | 111 (37.8) | |
| <i>Resident type</i> | | | |
| Rented | | 128 (43.5) | |
| Own | | 132 (44.9) | |
| Government/free quarter | | 12 (4.1) | |
| Hostel/Mess | | 22 (7.5) | |
| <i>Chronic disease</i> | | | |
| Yes | | 50 (17.0) | |
| No | | 244 (83.0) | |
| <i>Isolation from family member</i> | | | |
| Yes | | 89 (30.3) | |
| No | | 205 (69.7) | |
| <i>Facing financial problem</i> | | | |
| Yes | | 168 (55.8) | |
| No | | 130 (44.2) | |
| <i>Occupation</i> | | | |
| Medicine | | 110 (37.4) | |
| Dental | | 28 (9.5) | |
| Rehabilitation | | 82 (27.9) | |
| Nursing | | 28 (9.5) | |
| Medical Technology | | 46 (15.7) | |
| <i>Technical title</i> | | | |
| Senior | | 87 (19.6) | |
| Intermediate | | 172 (58.5) | |
| Junior | | 35 (11.9) | |
| <i>Employer</i> | | | |
| Medical college | | 69 (23.5) | |
| General Hospital | | 29 (9.9) | |
| Clinic | | 56 (19.0) | |
| Private chamber | | 66 (22.4) | |
| Others | | 74 (25.2) | |
| <i>Service categories</i> | | | |
| Government | | 48 (16.3) | |
| Private | | 167 (56.8) | |
| Self-employed and others | | 79 (26.9) | |
| <i>Current working position</i> | | | |
| Frontline | | 12 (4.1) | |
| Second-line | | 31 (10.5) | |
| General duties | | 138 (46.9) | |
| Working from home | | 113 (38.4) | |
| GAD-2 score | 1.54 (1.52) | | 0–6 |
| PHQ-9 score | 6.75 (5.0) | | 0–27 |
| ISI score | 7.69 (6.1) | | 0–28 |

However, the descriptive analysis found that the age group was associated with depression scores ($p = 0.002$) and insomnia scores ($p = 0.001$) scores. Our data shows that, more females reported anxiety ($p = 0.021$),

depression ($p = 0.038$) and insomnia symptoms ($p = 0.010$) than male workers. In addition, Being single was also associated with high prevalence of anxiety ($p = 0.001$), depression ($p = <0.001$) and insomnia

Table 2. Descriptive analysis: association between socio-demographic, clinical, financial and occupation-related factors and anxiety, depression, and insomnia.

| Factor | GAD-2 ≥3 | | p-value | PHQ-9 ≥10 | | p-value | ISI ≥8 | | p-value |
|-----------------------------------------|-----------|------------|--------------|-----------|------------|------------------|------------|------------|------------------|
| | Yes (n/%) | No (n/%) | | Yes (n/%) | No (n/%) | | Yes (n/%) | No (n/%) | |
| Total (294) | 61 (20.7) | 233 (79.3) | | 78 (26.5) | 216 (73.5) | | 130 (44.2) | 164 (55.8) | |
| <i>Age group</i> | | | 0.233 | | | 0.002 | | | 0.001 |
| 18–25 | 25 (28.1) | 64 (71.9) | | 34 (38.2) | 55 (61.8) | | 52 (58.4) | 37 (41.6) | |
| 26–30 | 23 (17.8) | 106 (82.2) | | 34 (26.4) | 95 (73.6) | | 56 (43.4) | 73 (56.6) | |
| 31–40 | 11 (17.7) | 51 (82.3) | | 6 (9.7) | 56 (90.3) | | 15 (24.2) | 47 (75.8) | |
| >40 | 2 (14.3) | 12 (85.7) | | 4 (28.6) | 10 (71.4) | | 7 (50) | 7 (50) | |
| <i>Gender</i> | | | 0.021 | | | 0.038 | | | 0.010 |
| Male | 34 (20.7) | 130 (79.3) | | 39 (23.8) | 125 (76.2) | | 61 (37.2) | 103 (62.8) | |
| Female | 25 (19.5) | 103 (80.5) | | 37 (28.9) | 91 (71.1) | | 67 (52.3) | 61 (47.7) | |
| Others | 2 (100) | 0 (0.0) | | 2 (100) | 0 (0.0) | | 2 (100) | 0 (0.0) | |
| <i>Marital status</i> | | | 0.001 | | | <0.001 | | | <0.001 |
| Single | 43 (27.9) | 111 (72.1) | | 56 (36.4) | 98 (63.6) | | 84 (54.5) | 70 (45.5) | |
| Married | 18 (12.8) | 122 (87.1) | | 22 (15.7) | 118 (84.3) | | 46 (32.9) | 94 (67.1) | |
| <i>Family size</i> | | | 0.747 | | | 0.721 | | | 0.506 |
| Small | 7 (16.7) | 35 (83.3) | | 9 (21.4) | 33 (78.6) | | 19 (45.2) | 23 (54.8) | |
| Medium | 43 (21.8) | 154 (78.2) | | 54 (27.4) | 143 (72.6) | | 83 (42.3) | 114 (57.9) | |
| Large | 11 (20) | 44 (80) | | 15 (27.3) | 40 (72.3) | | 28 (50.9) | 27 (49.1) | |
| <i>Family member aged over 50 years</i> | | | 0.547 | | | 0.225 | | | 0.614 |
| Yes | 40 (21.9) | 143 (78.1) | | 53 (28.9) | 130 (71.1) | | 83 (45.4) | 100 (54.6) | |
| No | 21 (18.9) | 90 (81.1) | | 25 (22.5) | 86 (77.5) | | 47 (42.3) | 64 (57.7) | |
| <i>Resident type</i> | | | 0.929 | | | 0.657 | | | 0.893 |
| Rented | 25 (19.5) | 103 (80.5) | | 31 (24.2) | 97 (75.8) | | 59 (46.1) | 69 (53.9) | |
| Own | 29 (22) | 103 (78) | | 38 (28.8) | 94 (71.2) | | 56 (42.4) | 76 (57.6) | |
| Gov./Free | 3 (25) | 9 (75) | | 2 (16.7) | 10 (83.3) | | 6 (50) | 6 (50) | |
| Hostel/Mess | 4 (18.2) | 18 (81.8) | | 7 (31.8) | 15 (68.2) | | 9 (40.9) | 13 (59.1) | |
| <i>Chronic disease</i> | | | 0.811 | | | 0.796 | | | 0.781 |
| Yes | 11 (22) | 39 (78) | | 14 (28) | 36 (72) | | 23 (46) | 27 (54) | |
| No | 50 (20.5) | 194 (79.5) | | 64 (26.2) | 180 (73.8) | | 107 (43.9) | 13756.1 | |
| <i>Isolation from family member</i> | | | 0.162 | | | 0.860 | | | 0.869 |
| Yes | 14 (15.7) | 75 (84.3) | | 23 (25.8) | 66 (74.2) | | 40 (44.9) | 49 (55.1) | |
| No | 47 (23.2) | 156 (76.8) | | 55 (26.8) | 150 (73.2) | | 90 (43.9) | 115 (56.1) | |
| <i>Facing financial problem</i> | | | 0.150 | | | 0.001 | | | <0.001 |
| Yes | 39 (23.8) | 125 (76.2) | | 56 (34.1) | 108 (35.9) | | 92 (56.1) | 72 (43.9) | |
| No | 22 (16.9) | 108 (83.1) | | 22 (16.9) | 108 (83.1) | | 38 (29.2) | 92 (70.8) | |
| <i>Occupation</i> | | | 0.018 | | | 0.813 | | | 0.830 |
| Medicine | 22 (20) | 88 (80) | | 28 (28) | 82 (82) | | 52 (47.3) | 58 (52.7) | |
| Dental | 8 (28.6) | 20 (71.4) | | 10 (35.7) | 18 (64.3) | | 14 (50) | 14 (50) | |
| Rehabilitation | 8 (9.8) | 74 (90.2) | | 20 (24.4) | 62 (75.6) | | 34 (41.5) | 48 (58.5) | |
| Nursing | 9 (32.1) | 19 (67.9) | | 7 (25) | 21 (75) | | 11 (39.3) | 17 (60.7) | |
| Medical technology | 14 (30.4) | 32 (69.6) | | 13 (28.3) | 33 (71.7) | | 19 (41.3) | 27 (58.7) | |
| <i>Technical title</i> | | | 0.005 | | | 0.165 | | | 0.151 |
| Senior | 10 (11.5) | 77 (87.5) | | 18 (20.7) | 69 (79.3) | | 33 (37.9) | 54 (62.1) | |
| Intermediate | 38 (22.1) | 134 (77.9) | | 47 (27.3) | 125 (72.7) | | 77 (44.8) | 95 (55.2) | |
| Junior | 13 (37.1) | 22 (62.9) | | 13 (37.1) | 22 (62.9) | | 20 (57.1) | 15 (42.9) | |
| <i>Employer</i> | | | 0.258 | | | 0.704 | | | 0.799 |
| Medical college | 12 (17.4) | 57 (82.6) | | 17 (24.6) | 52 (75.4) | | 27 (39.1) | 42 (60.9) | |
| General hospital | 10 (34.5) | 19 (65.5) | | 9 (31) | 20 (69) | | 12 (41.4) | 17 (58.6) | |
| Clinic | 13 (23.2) | 43 (76.8) | | 15 (26.8) | 41 (73.2) | | 24 (42.1) | 32 (57.1) | |
| Private chamber | 10 (15.2) | 56 (84.8) | | 14 (21.8) | 52 (78.8) | | 31 (47) | 35 (53) | |
| Others | 16 (21.6) | 58 (78.4) | | 23 (31.1) | 51 (68.9) | | 36 (48.6) | 38 (51.4) | |
| <i>Service categories</i> | | | 0.861 | | | 0.11 | | | 0.418 |
| Government | 10 (20.8) | 38 (79.2) | | 11 (22.9) | 37 (77.1) | | 18 (37.5) | 30 (62.5) | |
| Private | 33 (19.8) | 134 (80.2) | | 39 (23.4) | 128 (76.6) | | 73 (43.7) | 94 (56.3) | |
| Self-employed | 18 (22.8) | 61 (77.2) | | 28 (35.4) | 51 (64.6) | | 39 (49.3) | 40 (50.7) | |
| <i>Current working position</i> | | | 0.286 | | | 0.091 | | | 0.004 |
| Frontline | 2 (16.7) | 10 (83.3) | | 3 (25) | 9 (75) | | 5 (41.7) | 7 (58.3) | |
| Second-line | 5 (16.1) | 26 (83.9) | | 8 (25.8) | 23 (74.2) | | 10 (32.3) | 21 (67.7) | |

(continued on next page)

Table 2 (continued)

| Factor | GAD-2 ≥ 3 | | p-value | PHQ-9 ≥ 10 | | p-value | ISI ≥ 8 | | p-value |
|----------------|----------------|------------|---------|-----------------|------------|---------|--------------|-----------|---------|
| | Yes (n/%) | No (n/%) | | Yes (n/%) | No (n/%) | | Yes (n/%) | No (n/%) | |
| General duties | 24 (17.4) | 114 (82.6) | | 28 (20.3) | 110 (79.7) | | 50 (36.2) | 88 (63.8) | |
| Work from home | 30 (26.5) | 83 (73.5) | | 39 (34.5) | 74 (65.5) | | 65 (57.5) | 48 (42.5) | |

Bold faces are significant at 5% significance level.

Table 3. Multivariate logistic regression analysis of the variables with anxiety disorder.

| Variables | Odds Ratio | 95% Confidence Interval | p-value |
|------------------------|------------|-------------------------|--------------|
| <i>Gender</i> | | | |
| Female | Reference | | |
| Male | 1.065 | 0.550–2.063 | 0.851 |
| <i>Marital Status</i> | | | |
| Single | 2.628 | 1.367–5.052 | 0.004 |
| Married | Reference | | |
| <i>Occupation</i> | | | |
| Medicine | Reference | | |
| Dental | 3.449 | 1.119–10.628 | 0.031 |
| Rehabilitation | 2.333 | 0.962–5.657 | 0.061 |
| Nursing | 4.712 | 1.463–15.182 | 0.009 |
| Medical technology | 3.382 | 1.198–9.548 | 0.021 |
| <i>Technical title</i> | | | |
| Senior | Reference | | |
| Intermediate | 0.646 | 0.290–1.437 | 0.284 |
| Junior | 1.796 | 0.758–4.251 | 0.183 |

Bold faces are significant at 5% significance level.

symptoms ($p = <0.001$) among the HCWs. Furthermore, the financial burden also contributed to the increased incidences of depressive ($p = 0.001$) and insomnia ($p = <0.001$) symptoms among the HCWs. Table 2 demonstrated details.

3.3. Predictors of anxiety, depression, and insomnia symptoms

To find the predictors, independent variables that have been found statistically significant in the descriptive analysis were included in the regression models separately for generalized anxiety, depression and insomnia symptoms. Table 3 shows that the single living status (Adjusted Odds Ratio, AOR = 2.628, $p = 0.004$), being dentists (AOR = 3.449, $p = 0.031$), nurses (AOR = 4.712, $p = 0.009$) and medical technologists

(AOR = 3.382, $p = 0.021$) had statistically significantly predict generalized depression. Table 4 shows that single living status (AOR = 2.421, $p = 0.014$) and facing financial problems (AOR = 2.380, $p = 0.004$) were the statistically significant risk factors for developing symptoms of depression. Finally, for insomnia symptoms, the significant predictors were female gender (AOR = 2.196, $p = 0.005$), single living status (AOR = 1.892, $p = 0.046$) and financial hardships (AOR = 3.100, $p = <0.001$) (Table 5).

3.4. Association between mental health symptoms and insomnia

Mental health symptoms, that is, generalized anxiety and depression were strongly associated with insomnia, however, the depression

Table 4. Multivariate logistic regression analysis of the variables with depression symptoms.

| Variables | Odds Ratio | 95% Confidence Interval | p-value |
|---------------------------------|------------|-------------------------|--------------|
| <i>Age group</i> | | | |
| 18–25 | Reference | | |
| 26–30 | 0.818 | 0.424–1.582 | 0.551 |
| 31–40 | 0.378 | 0.128–1.117 | 0.078 |
| >40 | 1.283 | 0.309–5.339 | 0.731 |
| <i>Gender</i> | | | |
| Female | Reference | | |
| Male | 0.684 | 0.384–1.219 | 0.198 |
| <i>Marital Status</i> | | | |
| Single | 2.421 | 1.198–4.891 | 0.014 |
| Married | Reference | | |
| <i>Facing financial problem</i> | | | |
| Yes | 2.380 | 1.318–4.296 | 0.004 |
| No | Reference | | |

Bold faces are significant at 5% significance level.

Table 5. Multivariate logistic regression analysis of the variables with insomnia symptoms.

| Variables | Odds Ratio | 95% Confidence Interval | p-value |
|---------------------------------|------------|-------------------------|-------------------|
| <i>Age group</i> | | | |
| 18–25 | Reference | | |
| 26–30 | 0.794 | 0.418–1.509 | 0.482 |
| 31–40 | 0.552 | 0.223–1.362 | 0.197 |
| >40 | 1.340 | 0.344–5.221 | 0.673 |
| <i>Gender</i> | | | |
| Female | 2.196 | 1.272–3.791 | 0.005 |
| Male | Reference | | |
| <i>Marital Status</i> | | | |
| Single | 1.892 | 1.011–3.540 | 0.046 |
| Married | Reference | | |
| <i>Facing financial problem</i> | | | |
| Yes | 3.100 | 1.814–5.298 | < 0.001 |
| No | Reference | | |
| <i>Current working position</i> | | | |
| Frontline | Reference | | |
| Second line | 0.723 | 0.162–3.235 | 0.672 |
| General duties | 0.755 | 0.207–2.756 | 0.671 |
| Work from home | 1.067 | 0.286–3.974 | 0.923 |

Bold faces are significant at 5% significance level.

symptoms among HCWs were found to be a factor for insomnia (AOR = 6.321, 95% CI = 3.158–12.650). Details can be found in [Tables 6](#) and [7](#).

4. Discussion

Our findings revealed a high prevalence of anxiety, depression, and insomnia symptoms among HCWs working in hospital settings in Dhaka, Bangladesh, during the COVID-19 pandemic. Financial hardship and being a female worker were statistically important factors in increasing mental health symptoms. Further, depression was the independent predictor of insomnia symptoms among HCWs. A high number of young (aged 18–25 years) reported anxiety and insomnia. Our results are in agreement with studies conducted in Asia among HCWs during this pandemic ([Muller et al., 2020](#); [Qi et al., 2020](#)). Furthermore, another study conducted in Bangladesh among the general population suggested that more younger adults reported poorer mental wellbeing during the pandemic time ([Ali et al., 2020](#)). Another study conducted in Europe also

suggested that in the COVID-19 pandemic, a higher number of younger adults were suffering from anxiety and insomnia than older adults ([Solomou and Constantinidou, 2020](#)).

Our study findings indicated that the prevalence of depression, anxiety, and insomnia was significantly higher amongst females and single HCWs. Similar to our findings, previous studies conducted among HCWs amidst the COVID-19 pandemic also revealed that the female and single HCWs had more frequently reported anxiety and depression symptoms ([Di Tella et al., 2020](#); [Giusti et al., 2020](#); [Şahin et al., 2020b](#)). A review also has shown that the prevalence of anxiety and depression among Asian female and single HCWs during the COVID-19 pandemic was higher than their male counterparts ([Spoorthy et al., 2020](#)). Other studies conducted amid pandemic time also found a higher prevalence of insomnia among female and single HCWs ([Lai et al., 2020](#); [Muller et al., 2020](#); [Qi et al., 2020](#)).

An enormous financial threat to the world population has been imposed as an impact of the COVID-19 pandemic. Results from our study

Table 6. Descriptive analysis: Association between mental health symptoms and insomnia.

| Mental Health Symptoms | Insomnia symptoms | | p-value |
|-------------------------------------|-------------------|-----------|---------|
| | No (n %) | Yes (n %) | |
| <i>Generalized anxiety disorder</i> | | | |
| No | 146 (62.7) | 87 (37.3) | <0.001 |
| Yes | 18 (29.5) | 43 (70.5) | |
| <i>Depression symptoms</i> | | | |
| No | 147 (68.1) | 69 (31.9) | <0.001 |
| Yes | 17 (21.8) | 61 (78.2) | |

Table 7. Multivariate logistic regression analysis of the mental health symptoms with insomnia symptoms.

| Mental health symptoms | Odds Ratio | 95% Confidence Interval | p-value |
|----------------------------|------------|-------------------------|---------|
| <i>Generalized anxiety</i> | | | |
| No | Reference | | |
| Yes | 1.498 | 0.708–3.170 | 0.291 |
| <i>Depression symptoms</i> | | | |
| No | Reference | | |
| Yes | 6.321 | 3.158–12.650 | <0.001 |

indicated that financial difficulties caused by the COVID 19 pandemic in Bangladesh played a crucial role when predicting insomnia and all the mental health problems in HCWs we have measured. The mental health impact of financial hardships among HCWs during this pandemic time is yet to be evaluated elaborately. However, the previous study showed a highly significant association between financial hardship and mental health among Bangladeshi professionals (Mamun et al., 2020). On the other hand, in line with similar studies (Lai et al., 2020; Que et al., 2020), we found junior HCWs more frequently presented with poor mental health. Besides, research conducted among the European general population during the COVID 19 pandemic found poorer mental health in females, younger adults, and those who were with severe financial difficulties (Skapinakis et al., 2020). Nonetheless, further evaluation is warranted to find in-depth predicting nature of the financial issues raised due to the COVID-19 pandemic to the mental health of sufferers.

Additionally, our study found that a high number of nurses complained about mental health problems. Usually, nurses are at the highest risk of infection because of their close, frequent contact with patients, and longer working hours. Thus, the nature of the job could explain the higher prevalence of mental health problems among nurses during the overwhelming pressure at the pandemic time. Similarly, a study with a large sample size conducted in Europe also found a higher prevalence of mental health problems among nurses (Rossi et al., 2020).

We found a highly significant association between anxiety, depression and insomnia. However, depression was predicting insomnia independently, that is, insomnia was more than six times higher among HCWs demonstrating depression symptoms. In line with our findings, a population-based study among 19-69-year-old adults suggested that anxiety and depression are strongly associated with insomnia (Oh et al., 2019). A systematic review and meta-analysis also confirmed that insomnia is more prevalent among the population with depression (Li et al., 2016). Since insomnia is highly prevalent among different groups of population amid the COVID-19 pandemic (Jahrami et al., 2021), further studies are required to determine the association between pandemic related anxiety, depression and stress with insomnia symptoms among professional working groups specially HCWs.

4.1. Limitations

The study has some limitations that need to be addressed. Firstly, the limitations of cross-sectional studies cannot be ruled out in this research. Secondly, there might have been the introduction of selection bias as that HCWs without internet access, and those who might have been busy in their work duties might not have participated in the study. Finally, mental health state is a subject to be changed over time (Bertolote, 2008). In this study, HCWs were not asked about their mental health before the COVID-19 pandemic has been started. However, a longitudinal study monitoring and comparing the changes in the mental health status of HCWs during the pandemic would provide better insights into the mental health status of the HCWs working in the hospital settings. Besides, a larger sample size study to compare the mental health of frontline HCWs with the rest is also warranted.

5. Conclusion

The high prevalence of mental health problems among HCWs during the current pandemic suggests that the HCW community working at hospitalized settings in Dhaka city is have been exposed to increased levels of mental stress, potentially resulting in anxiety, depression and, insomnia. Arrangement for financial assistance for HCWs and support for female care workers in facilities could help to relieve the mental stress from healthcare workers. Supportive, training, and instructional interventions, especially through information and communication channels, may be recommended to care facilities to help HCWs cope with mental health symptoms. Further, online mindfulness and relaxation

therapy are considered helpful for the HCWs to cope with anxiety and depression during the pandemic time (Sidi, 2020).

Declarations

Author contribution statement

Mohammad Ali: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Zakir Uddin, Nawara Faiza Ahsan, Muhammad Zahirul Haque, Monisha Bairagee: Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Sabbir Ahmed Khan, Ahmed Hossain: Conceived and designed the experiments; Performed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability statement

Data will be made available on request.

Declaration of interests statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

References

- Ali, M., Ahsan, G.U., Khan, R., Khan, H.R., Hossain, A., 2020. Immediate impact of stay-at-home orders to control COVID-19 transmission on mental well-being in Bangladeshi adults: patterns, Explanations, and future directions. *BMC Res. Notes* 13 (1), 494.
- Barranco, R., Ventura, F., 2020. Covid-19 and infection in health-care workers: an emerging problem. *Med. Leg. J.* 88 (2), 65–66.
- Bertolote, J.M., 2008. The roots of the concept of mental health. *World Psychiatr.* 7, 113–116.
- Brooks, S.K., Webster, R.K., Smith, L.E., Woodland, L., Wessely, S., Greenberg, N., Rubin, G.J., 2020. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet* 395, 912–920.
- Chew, N.W.S., Lee, G.K.H., Tan, B.Y.Q., Jing, M., Goh, Y., Ngiam, N.J.H., et al., 2020. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav. Immun.* 88, 559–565.
- Di Tella, M., Romeo, A., Benfante, A., Castelli, L., 2020. Mental health of healthcare workers during the COVID -19 pandemic in Italy. *J. Eval. Clin. Pract.* (May) jep.13444.
- Eysenbach, G., 2004. Improving the quality of web surveys: the checklist for reporting results of internet E-surveys (CHERRIES). *J. Med. Internet Res.* 6 (3), e34.
- Gan, W.H., Lim, J.W., Koh, D., 2020. Preventing intra-hospital infection and transmission of coronavirus disease 2019 in health-care workers. *Safety Health* 11 (2), 241–243 at Work.
- Giusti, E.M., Pedroli, E., D'Aniello, G.E., Stramba Badiale, C., Pietrabissa, G., Manna, C., et al., 2020. The psychological impact of the COVID-19 outbreak on health professionals: a cross-sectional study. *Front. Psychol.* 11, 1684.
- Herron, J.B.T., Hay-David, A.G.C., Gilliam, A.D., Brennan, P.A., 2020. Personal protective equipment and Covid 19- a risk to healthcare staff? *Br. J. Oral Maxillofac. Surg.* 58 (5), 500–502.
- Islam, S., Akter, R., Sikder, T., Griffiths, M.D., 2020. Prevalence and factors associated with depression and anxiety among first-year university students in Bangladesh: a cross-sectional study. *Int. J. Ment. Health Addiction* 1–14.
- Jahrami, H., BaHammam, A.S., Bragazzi, N.L., Saif, Z., Faris, M., Vitiello, M.V., 2021. February 1). Sleep problems during the COVID-19 pandemic by population: a systematic review and meta-analysis. *J. Clin. Sleep Med.* 17, 299–313.
- Jordan, P., Shedden-Mora, M.C., Lô We, B., 2017. Psychometric Analysis of the Generalized Anxiety Disorder Scale (GAD-7) in Primary Care Using Modern Item Response Theory.

- Kroenke, K., Spitzer, R.L., 2002. September 1). The PHQ-9: a new depression diagnostic and severity measure. *Psychiatr. Ann.* 32, 509–515.
- Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., et al., 2020. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open* 3 (3), e203976.
- Li, L., Wu, C., Gan, Y., Qu, X., Lu, Z., 2016. Insomnia and the risk of depression: a meta-analysis of prospective cohort studies. *BMC Psychiatr.* 16 (1), 375.
- Löwe, B., Wahl, I., Rose, M., Spitzer, C., Glaesmer, H., Wingenfeld, K., et al., 2010. A 4-item measure of depression and anxiety: validation and standardization of the Patient Health Questionnaire-4 (PHQ-4) in the general population. *J. Affect. Disord.* 122 (1–2), 86–95.
- Mamun, M.A., Akter, S., Hossain, I., Faisal, M.T.H., Rahman, M.A., Arefin, A., et al., 2020. Financial threat, hardship and distress predict depression, anxiety and stress among the unemployed youths: a Bangladeshi multi-city study. *J. Affect. Disord.* 276, 1149–1158.
- Morin, C.M., Belleville, G., Bélanger, L., Ivers, H., 2011. The insomnia severity Index: psychometric indicators to detect insomnia cases and evaluate treatment response. *Sleep* 34 (5), 601–608.
- Muller, A.E., Hafstad, E.V., Himmels, J.P.W., Smedslund, G., Flottorp, S., Stensland, S.Ø., et al., 2020. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: a rapid systematic review. *Psychiatr. Res.* 293, 113441.
- Oh, C.-M., Kim, H.Y., Na, H.K., Cho, K.H., Chu, M.K., 2019. The effect of anxiety and depression on sleep quality of individuals with high risk for insomnia: a population-based study. *Front. Neurol.* 10 (JUL).
- Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V.G., Papoutsis, E., Katsaounou, P., 2020. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav. Immun.* 88, 901–907.
- Qi, J., Xu, J., Li, B.Z., Huang, J.S., Yang, Y., Zhang, Z.T., et al., 2020. The evaluation of sleep disturbances for Chinese frontline medical workers under the outbreak of COVID-19. *Sleep Med.* 72, 1–4.
- Que, J., Shi, L., Deng, J., Liu, J., Zhang, L., Wu, S., et al., 2020. Psychological impact of the COVID-19 pandemic on healthcare workers: a cross-sectional study in China. *Gener. Psychiatr.* 33 (3), e100259.
- Rahman, A., Plummer, V., 2020. COVID-19 related suicide among hospital nurses; case study evidence from worldwide media reports. *Psychiatr. Res.* 291, 113272.
- Rossi, R., Succi, V., Pacitti, F., Mensi, S., Di Marco, A., Siracusano, A., Di Lorenzo, G., 2020. Mental health outcomes among healthcare workers and the general population during the COVID-19 in Italy. *Front. Psychol.* 11, 3332.
- Şahin, M.K., Aker, S., Şahin, G., Karabekiroğlu, A., 2020a. Prevalence of depression, anxiety, distress and insomnia and related factors in healthcare workers during COVID-19 pandemic in Turkey. *J. Community Health* 45 (6), 1168–1177.
- Şahin, M.K., Aker, S., Şahin, G., Karabekiroğlu, A., 2020b. Prevalence of depression, anxiety, distress and insomnia and related factors in healthcare workers during COVID-19 pandemic in Turkey. *J. Community Health* 45 (6), 1168–1177.
- Sasaki, N., Kuroda, R., Tsuno, K., Kawakami, N., 2020. Workplace responses to COVID-19 associated with mental health and work performance of employees in Japan. *J. Occup. Health* 62 (1), e12134.
- Sidi, H., 2020. The psychological sequelae during mental health and COVID-19 pandemic: learning from the past for today's coping styles. *Med. Health* 15 (1), 1–4.
- Skapinakis, P., Bellos, S., Oikonomou, A., Dimitriadis, G., Gkikas, P., Perdikiari, E., Mavreas, V., 2020. Depression and its relationship with coping strategies and illness perceptions during the COVID-19 lockdown in Greece: a cross-sectional survey of the population. *Depress. Res. Treat.* 2020, 1–11.
- Solomou, I., Constantinidou, F., 2020. Prevalence and predictors of anxiety and depression symptoms during the COVID-19 pandemic and compliance with precautionary measures: age and sex matter. *Int. J. Environ. Res. Publ. Health* 17 (14), 4924.
- Spoorthy, M.S., Pratapa, S.K., Mahant, S., 2020. Mental health problems faced by healthcare workers due to the COVID-19 pandemic—A review. *As. J. Psychia.* 51, 102119.
- Xiaoming, X., Ming, A., Su, H., Wo, W., Jianmei, C., Qi, Z., et al., 2020. The psychological status of 8817 hospital workers during COVID-19 Epidemic: a cross-sectional study in Chongqing. *J. Affect. Disord.* 276, 555–561.
- Zhang, C., Yang, L., Liu, S., Ma, S., Wang, Y., Cai, Z., et al., 2020. Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Front. Psychiatr.* 11, 1.